Dtsch. Entomol. Z. 72 (1) 2025, 9–14 | DOI 10.3897/dez.72.144365

PENSOFT.

für Natur MUSEUM FÜR NATURKUNDE BERLIN

Triartiger caiyujiei sp. nov., a remarkable clavigerite beetle (Coleoptera, Staphylinidae, Pselaphinae) associated with *Pseudolasius* ants (Hymenoptera, Formicidae) from East China

Zi-Wei Yin[1], Xiao-Ling Niu[2]

1 *Laboratory of Systematic Entomology, College of Life Sciences, Shanghai Normal University, Shanghai 200234, China*
2 *Zhengjiang Tianmshan National Nature Reserve Management Bureau, Linan, Hangzhou 311300, Zhejiang, China*

https://zoobank.org/E82AFF4A-F2BA-48AD-A246-D966CC7EF57D

Corresponding author: Zi-Wei Yin (pselaphinae@gmail.com)

Academic editor: Emmanuel A. Varela ♦ **Received** 13 December 2024 ♦ **Accepted** 7 February 2025 ♦ **Published** 15 April 2025

Abstract

The genus *Triartiger* Kubota (Pselaphinae, Clavigeritae) represents an enigmatic group of obligately myrmecophilous ant-loving beetles endemic to East Asia. Prior to this study, six species had been known across China's mainland (Jiangxi, Fujian), Taiwan Island, and Tsushima Island of Japan, with merely two species having its symbiotic host recorded through direct collection. Herein, a remarkable new species is described: *Triartiger caiyujiei* **sp. nov.** discovered in a colony of *Pseudolasius* Emery (Hymenoptera, Formicidae) ants at the Tianmushan National Nature Reserve in Zhejiang Province, east China. The new taxon can be distinguished from congeners by its exceptionally elongated antennae and the most intricate elytral and abdominal trichome structures observed within the genus. The key to world species of *Triartiger* is updated and the current knowledge of the genus is summarised to facilitate future research.

Key Words

Ant-loving beetles, Asia, Clavigerini, new taxon, myrmecophily, taxonomy

Introduction

The quote "Life is like a box of chocolates, you never know what you're gonna get" from the 1994 movie "Forrest Gump" aptly describes the unexpected and dynamic taxonomic progress of the genus *Triartiger* Kubota on the Chinese mainland. Members of the group are cryptic, small-bodied ant-loving beetles belonging to the obligately myrmecophilous supertribe Clavigeritae (Pselaphinae). These beetles are primarily characterised by their three-segmented antennae and typically compact body forms. The taxonomic history of *Triartiger* reflects a gradual expansion of knowledge over several decades. Four species of this genus, distributed on the islands of Tsushima and Taiwan, were described in 1944, 1997 and 2008, respectively (Kubota 1944; Nomura 1997; Besuchet 2008). However, none of these descriptions provided data on host associations, leaving a significant knowledge gap in the ecology and life history of these species. Maruyama et al. (2013), in their illustrated handbook, provided a picture of more than a dozen *T. reductus* Nomura adults assembled in a *Crematogaster osakensis* Forel nest, marking the first record of a host ant for the genus. While progress has been made on the study of various clavigerite groups occurring in the country (e.g. Yin and Li (2013, 2014); Yin (2018, 2023a); Yin and He (2020); Yin et al. (2020)), the vast land territory of Chinese mainland remained virtually unexplored for *Triartiger* diversity until recently, likely due to the cryptic lifestyle of the genus and the inherent challenges in sampling myrmecophilous insects. Remarkably, three species have been sporadically discovered in eastern China within a single fiscal year (Dec 2023–Dec 2024): the first species was found in Fujian's mountainous region, within a colony of the ant *Tetramorium nipponense* Wheeler (Yin 2023b), constituting the second confirmed host relationship for the genus. The second species was subsequently collected via

Copyright *Zi-Wei Yin & Xiao-Ling Niu*. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

a flight intercept trap at Mount Meiling, Jiangxi (Yin and Du 2024) and a newly-discovered species, which is described in the present paper.

This study aims to provide a detailed description and characterisation of this latest species, including information on its host association. Furthermore, the current knowledge of the genus is summarised and an updated key to world species is presented to facilitate future taxonomic efforts and the potential recognition of new taxa. The discovery of an additional *Triartiger* species from an easily accessible site at the West Tianmu Mountain points to the great potential of a largely undocumented clavigerite diversity in China.

Material and methods

The specimen examined in this study is deposited in the Insect Collection of Shanghai Normal University, Shanghai, China (**SNUC**). Label data are quoted verbatim. Dissected parts were mounted in Euparal on plastic slides and pinned with the specimen. Habitus images were captured using a Canon EOS R5 camera equipped with a 10 × Mitutoyo M Plan Apo lens, illuminated by three 10W LED bulbs (5500 K). Images of the morphological details were produced using a Canon G9 camera mounted to an Olympus CX31 microscope under reflected or transmitted light. Image stacking was performed using Helicon Focus v. 8.2.0 Pro and all images were edited and compiled into plates using Adobe Photoshop CC 2020. Structural highlights of the aedeagus were added using Adobe Illustrator 27.3.1.

Measurements were taken as follows: total body length from the anterior margin of the clypeus to the apex of the abdomen; head length from the anterior margin of the clypeus to the head base, excluding the cervical constriction; head width across the eyes; pronotal length along the mid-line; pronotal width at its maximum; elytral length along the suture; elytral width at their maximum across both elytra; abdominal length of the dorsally exposed part along its mid-line; and abdominal width at its maximum. Terminology follows Chandler (2001) and Yin (2022). Abdominal tergites and sternites are numbered in Arabic numerals (starting from the first visible segment) and Roman numerals (reflecting true morphological position), for example, tergite 1 (IV) or sternite 1 (III). Paired appendages in the descriptions are treated as singular.

Taxonomy

Family Staphylinidae Latreille, 1802
Subfamily Pselaphinae Latreille, 1802
Supertribe Clavigeritae Leach, 1815
Tribe Clavigerini Leach, 1815
Subtribe Clavigerina Leach, 1815

Genus *Triartiger* Kubota, 1944

Type species. *Triartiger urceus* Kubota, 1944: 11, by original designation.

***Triartiger caiyujiei* Yin & Niu, sp. nov.**

https://zoobank.org/C23E8A6A-E46B-4660-8AE5-4A77983CD7DD

Figs 1, 2

Chinese common name: 蔡氏三节蚁甲

Type material. ***Holotype*: China:** • ♂, 'China: Zhejiang, Linan City, W. Tianmushan Nature Reserve, 30°20'33.22"N, 119°25'41.19"E, pass to summit, nr. Luopansong, 1245 m elev., 03.v.2024, C.-Y. Jie leg., 天目山近罗盘松石块下蚁巢, 蔡余杰' (SNUC).

Diagnosis. Male. Habitus moderately stout, with relatively long antennae and legs. Body length approximately 2.3 mm. Head and pronotal base with distinct microsculpture cuticle and covered by suberect setae; antenna with short antennomeres 1 and 2 and exceptionally long antennomere 3; 3 approximately 13 × as long as 2. Elytra finely punctate, lacking linear sculpture, posterior margins with large trichomes. Mesofemur with large blade-like ventral spine, mesotibia with large triangular spine at approximately middle of mesal margin; metafemur simple. Abdomen suboval; composite tergite deeply and broadly concave at base, with pair of broad basolateral trichomes, disc glabrous and with long, sparse setae; paratergites 1 (IV) with broadly curved longitudinal trichomes at bases; posterior margin of composite tergite and tergite 4 (VII) with row of long setae. Aedeagus dorso-ventrally symmetrical, divided into basal and apical parts; basal capsule with large ventral projection, apical lobe abruptly narrowed before apex. **Female.** Unknown.

Description. Male. Body (Fig. 1A) length 2.33 mm; colour reddish-brown, tarsi and mouthparts lighter in colour. Dorsal surface of head, pronotum and elytral disc covered with suberect setae, those of head and pronotum distinctly longer than elytral disc; setae of abdominal disc sparse and long, those along posterior margin much denser than disc.

Head (Figs. 1B and C) dorsally subcylindrical, much longer than wide, length 0.46 mm, width across eyes 0.30 mm; vertex slightly convex, foveae (dorsal tentorial pits) (Fig. 1B; *vf*) laterally located just above eyes; frons forming narrow rostrum, extending anteriorly to form vertical keel at middle; vertex and lateral portions of head with distinct microsculpture, frons smooth, finely punctate; clypeus markedly short, anterior margin with short, sparse setae. Venter with rough surface, gular region broadly and moderately impressed, tiny gular foveae (posterior tentorial pits) widely separated, lacking median carina. Compound eyes weakly prominent, each composed of approximately 10 ommatidia. Cervical part sub-globose, surface with distinct reticulate microsculpture. Antenna (Fig. 1D) 0.72 mm long, lacking modifications; antennomere 1 thick and short, dorsally completely covered by rostrum, invisible, 2 slightly shorter than 1, transverse, dorsally partially visible, antennomere 3, 0.67 mm long, 0.15 mm wide, 13.4 × as long as 2, narrowing from base towards apex, broadest and truncate at apex.

Pronotum (Fig. 1C) approximately as long as wide, length 0.44 mm, width 0.43 mm, widest at approximately anterior 1/3, basal 1/3 with microsculpture similar to that of head; lateral margins rounded at widest point, narrowing anteriorly and slightly so posteriorly; disc slightly impressed mediobasally, lacking foveae. Prosternum with

basisternal (precoxal) portion longer than procoxal rests, lacking procoxal foveae; hypomera completely fused with sternum, lacking hypomeral grooves and carinae.

Elytra tightly joined, subtrapezoidal, much wider than long, length 0.49 mm, width 0.94 mm, lacking foveae, anterior margin greatly oblique; each elytron with one complete adsutural carina and one short discal carina originating from base; posterolateral margins roundly convex; posteromedial portions with patches of dense, long setae, posterolateral portions with large, triangular trichomes (Fig. 1A). Metathoracic wings remnant.

Mesoventrite short, fused with metaventrite, with median mesoventral foveae anterior to median keel, the latter angularly projecting at middle; pair of small lateral mesoventral foveae present. Metaventrite greatly convex at middle, descending laterally, lacking foveae, broad metaventral intercoxal process widely separating coxae and broadly and slightly convex at middle; area anterior to process with golden, densely setose patch.

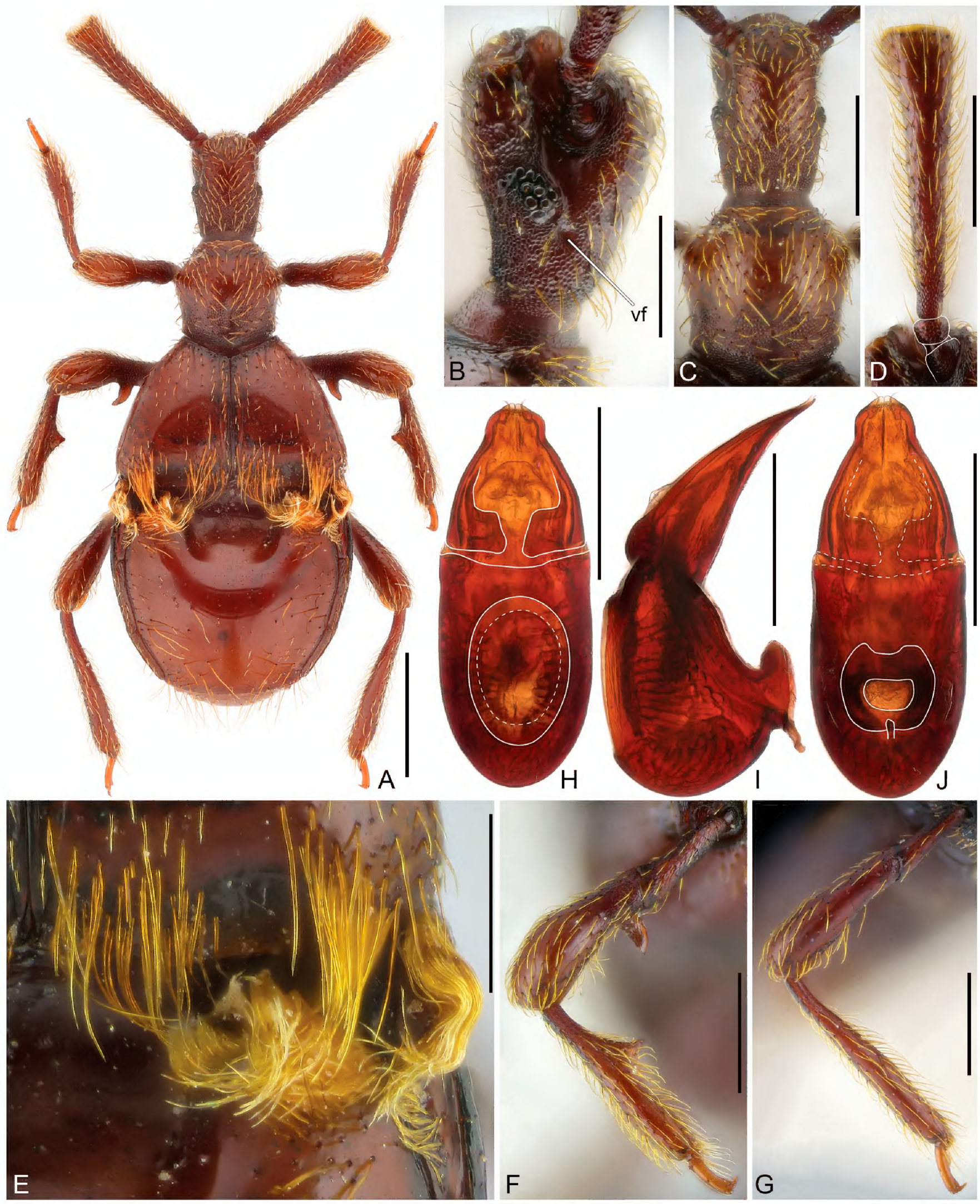

Figure 1. *Triartiger caiyujiei* sp. nov., male. **A.** Dorsal habitus; **B.** Head, lateral (vf = vertexal fovea); **C.** Head dorsum and pronotum; **D.** Antenna; **E.** Trichome of elytral apex and abdominal base; **F.** Middle leg; **G.** Hind leg; **H–J.** Aedeagus, dorsal (**H**), lateral (**I**) and ventral (**J**). Scale bars: 0.5 mm (**A**); 0.3 mm (**B–D, F, G**); 0.2 mm (**E, H–J**).

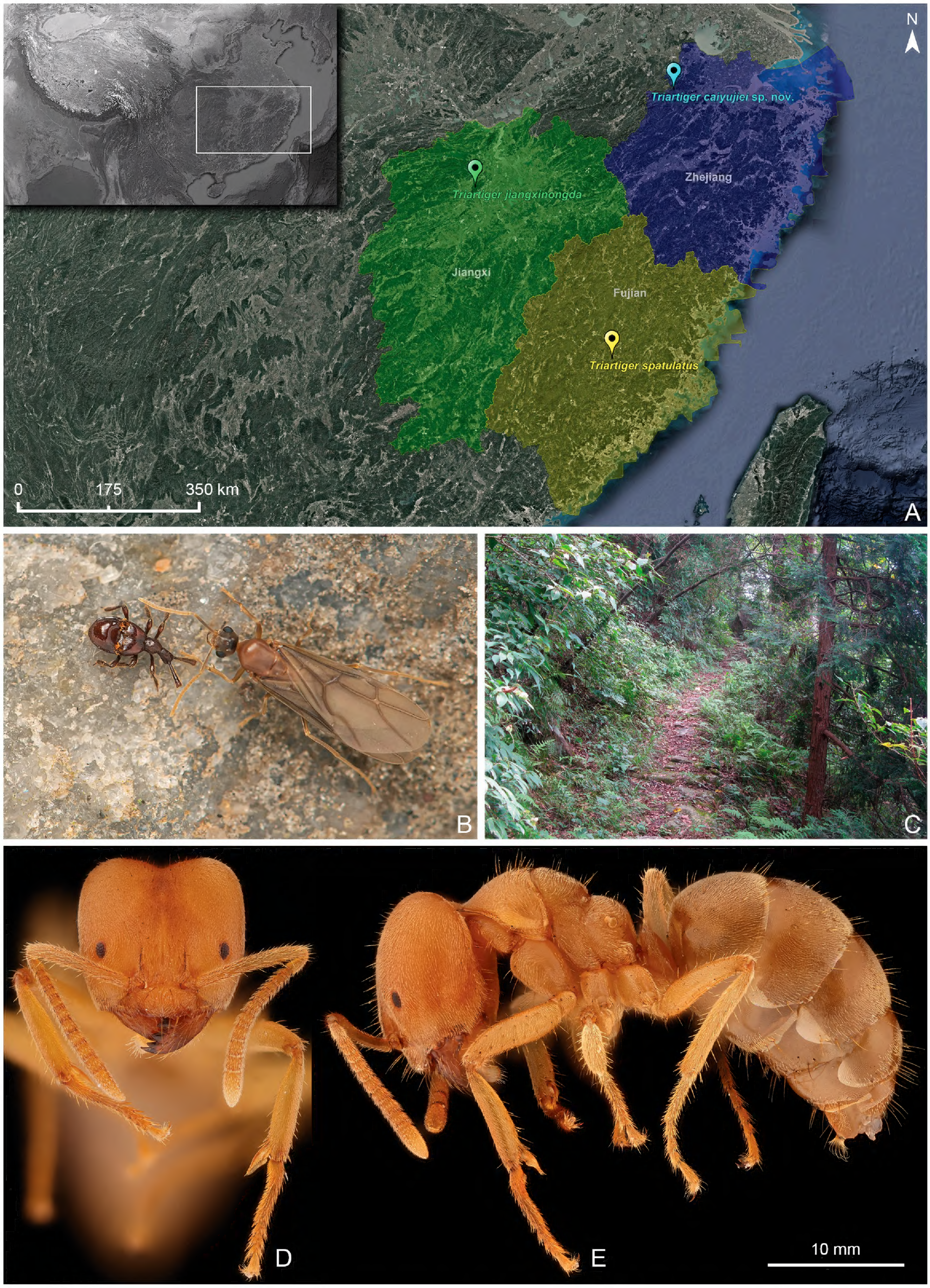

Figure 2. Distribution and biology of *Triartiger caiyujiei* sp. nov. **A.** Distribution of *Triartiger* species on China's mainland; **B.** An adult *T. caiyujiei* sp. nov. with a male *Pseudolasius* ant; **C.** General environment of the collecting site; **D, E.** Host ant worker, full-face view (**D**) and lateral habitus (**E**).

Table 1. Current knowledge of the genus *Triartiger*.

Species	Distribution	Collecting method	Host	Available material	Reference
T. caiyujiei sp. nov.	Zhejiang	by hand	*Pseudolasius* sp.	Holotype ♂	present study
T. jiangxinongda Yin & Du, 2024	Jiangxi	FIT*	unknown	Holotype ♂	Yin and Du (2024)
T. klapperichorum Nomura, 1997	Taiwan	FIT*	unknown	Holotype ♀ + 1 ♂, 6 ♀♀	Nomura (1997); Sugaya and Maruyama (2003)
T. nomurai Besuchet, 2008	Taiwan	unknown	unknown	Holotype ♂ + paratype 1 ♂, 2 ♀♀	Besuchet (2008)
T. reductus Nomura, 1997	Tsushima	unknown	*Crematogaster osakensis*	Holotype ♀ + 1 ♂, 1 ♀ + at least 13 exx.	Nomura (1997, 1999); Maruyama et al. (2013)
T. spatulatus Yin, 2023	Fujian	by hand	*Tetramorium nipponense*	Holotype ♂	Yin (2023b)
T. urceus Kubota, 1944	Taiwan	unknown	unknown	Holotype ♀ + 2 ♂♂, 3 ♀♀	Kubota (1944); Nomura (1997)

*Note: FIT = flight intercept trap.

Legs long; mesofemur and mesotibia (Fig. 1F) each with one large, blade-like and one much larger, subtriangular spine on ventral and middle of mesal margin, respectively; metafemur (Fig. 1G) simple, lacking tubercles or spines.

Abdomen slightly broader than elytra, suboval, widest at basolateral margins of composite tergite, length 0.92 mm, width 0.98 mm. Tergite 1 (composite tergite formed by tergites 1–3 (IV–VI)) deeply concave at base, with pair of large basolateral sockets, with large trichomes (Fig. 1E) mesal and posterior to sockets, 2 (VII) short, transverse, with pair of small lateral nodules and foveae, 3 (VIII) transverse, roundly triangular, with pair of small basolateral foveae, posterior margin rounded. Paratergites 1 (IV) with greatly curved, longitudinal trichomes (Fig. 1E) at bases. Sternites finely punctate, 2 (IV) as long as 3 (V)–5 (VII) combined, with band of dense setae along base, with slightly prominent keel at middle, area lateral to keel weakly impressed, lacking foveae, 3 at middle as long as 4 (VI) and 5 combined, 2–4 each with distinct microsculpture on posterior half; 6 (VIII) transverse, posterior margin broadly emarginate at middle, 7 (IX) not observed.

Aedeagus (Figs. 1H–J) 0.47 mm long, dorsoventrally symmetrical; median lobe divided into basal capsule and apical lobe, lacking parameres; basal capsule elongate, broadened and rounded at base, with large ventral projection and small, transverse foramen, dorsally with large oval diaphragm, apical lobe narrowing apically and abruptly narrowed before apex, in lateral view pointed apically, with two short, tiny apical setae; endophallus armature composed of short sclerite at middle of capsule.

Female. Unknown.

Comparative notes. The addition of the present species brings the total number of known species of the genus to seven. This species is relatively large within the genus and can be readily distinguished from *T. reductus* Nomura, *T. jiangxinongda* Yin & Du and *T. spatulatus* Yin by its exceptionally elongate terminal antennal segment, whereas the latter three species possess considerably shorter antennae in proportion to their head size. The new species can be easily differentiated from *T. urceus* Kubota and *T. nomurai* Besuchet by the nearly straight mesal and lateral margins of antennomere 3, in contrast to the slightly swollen mesal margins in the latter two species. *Triartiger caiyujiei* sp. nov. differs from *T. klapperichorum* Nomura in its relatively longer antennomere 3 (13 × vs. 8.5 × as long as antennomere 2) and the presence of additional setose patches on the posteromedial portions of the elytra. To facilitate identification, an updated key to all known species is provided below.

Distribution. East China: Zhejiang (Fig. 2A).

Biology. The single adult was collected from a small *Pseudolasius* Emery ant colony nesting under a stone (Fig. 2B) in a mixed coniferous-deciduous forest (Fig. 2C). This represents only the third *Triartiger* species with a known symbiotic host (Fig. 2D, E). Members of this genus are notably rare in both the field and museum collections and the biology and natural history of most species remain poorly understood. The current knowledge on the distribution, collecting methods, host associations and material availability of the genus is summarised in Table 1 to facilitate future studies.

Etymology. The species epithet is dedicated to Yu-Jie Cai (蔡余杰), who collected the single adult and provided it for study. The name is a noun in the genitive case.

Updated key to world species (males)

1 Larger species, body length approximately 2.1–2.8 mm; antennae distinctly longer, more than 1.5 × as long as head. 2
– Smaller species, body length approximately 1.8–2.0 mm; antennae relatively shorter, 1.1–1.2 × as long as head..... 5
2 Mesal side of antennomere 3 slightly swollen at middle 3
– Both sides of antennomere 3 almost straight 4
3 Antennomere 3 relatively more slender and longer (length (0.68 mm)/width (0.13 mm) 5.2; tempora slightly narrowing posteriorly; setae of posterolateral portions of elytra sparser ..... *T. urceus* Kubota
– Antennomere 3 relatively less slender and shorter (length (0.53 mm)/width (0.11 mm) 4.8; tempora subparallel; setae of posterolateral portions of elytra denser, forming trichomes ..... *T. nomurai* Besuchet

4 Antennomere 3 distinctly longer, more than 13 × as long as antennomere 2 (Figs 1A, D); posteromedial portions of elytra with setose patches composed of long pubescence (Figs 1A, E); posterior half of abdomen with sparse, long setae and posterior margin of abdomen with row of long setae (Fig. 1A) ..... *T. caiyujiei* sp. nov.

– Antennomere 3 distinctly shorter, approximately 8.5 × as long as antennomere 2; posteromedial portions of elytra lacking setose patches; posterior half and posterior margin of abdomen devoid of long setae (Sugaya and Maruyama 2003: fig. 1) ..... *T. klapperichorum* Nomura

5 Dorsal vestiture of head, pronotum and elytra normally setose, lacking spatulate setae (Nomura 1999: fig. 1); trichomes of elytra and abdomen reduced (Nomura 1999: fig. 1); aedeagus distinctly and gradually narrowing from broadest point apically, forming narrowed apex (Nomura 1999: fig. 3) ..... *T. reductus* Nomura

– Dorsal vestiture of head, pronotum and elytra with spatulate setae; trichomes of elytra and abdomen well developed; aedeagus with relatively broad apex 6

6 Head relatively shorter, length/width approximately 1.2 (Yin and Du 2024: figs 1A, B); lateral margins of head and pronotum and elytra with spinose, non-spatulate setae (Yin and Du 2024: figs 1A, B); aedeagus relatively more slender (Yin and Du 2024: figs 1G–I) ..... *T. jiangxinongda* Yin & Du

– Head relatively longer, length/width approximately 1.4 (Yin 2023b: figs 1A, B); lateral margins of head and pronotum and elytra with spatulatee setae (Yin 2023b: figs 1A, B); aedeagus relatively broader (Yin 2023b: figs 1G, H) ..... *T. spatulatus* Yin

Acknowledgements

Thanks to Yu-Jie Cai (蔡余杰; Shanghai Yangpu District Youth Science and Technology Station, Shanghai, China) for collecting and gift of the specimen used in this work and to Zhi-Lin Chen (陈志林; Guangxi Normal University, Guilin, China) for identifying the ants. Rostislav Bekchiev (National Museum of Natural History, Sofia, Bulgaria) and Shûhei Nomura (National Museum of Nature and Science, Tsukuba, Japan) commented on the draft manuscript which improved the paper. Financial support was provided by the National Natural Science Foundation of China (no. 32370465) to ZWY and Forestry Science and Technology Extension Project of Forestry Department of Zhejiang Province (no. 2011B015) to XLN.

References

Besuchet C (2008) Synonymies et combinaisons nouvelles, revalidations et description de taxa nouveaux de Pselaphinae (Coleoptera: Staphylinidae). Mitteilungen der Schweizerischen Entomologischen Gesellschaft 81(1–2): 61–82.

Chandler DS (2001) Biology, morphology and systematics of the ant-like litter beetles of Australia (Coleoptera: Staphylinidae: Pselaphinae). Memoirs on Entomology, International 15: 1–560.

Kubota M (1944) New and little known Pselaphidae from Japan. Transactions of the Kansai Entomological Society 14(1): 6–11.

Maruyama M, Komatsu T, Kinomura K, Shimada T (2013) The guests of Japanese ants. Tokai University Press, Minamiyana, Hadano-shi, Kanagawa, Japan, [xii +] 208 pp. [in Japanese and English]

Nomura S (1997) A revision of the clavigerine genus *Triartiger* Kubota (Coleoptera, Staphylinidae, Pselaphinae) from Taiwan and Japan. Elytra 25(2): 435–444.

Nomura S (1999) Further note on the clavigerine species *Triartiger reductus* Nomura (Coleoptera, Staphylinidae, Pselaphinae). Elytra 27(2): 499–501.

Sugaya H, Maruyama M (2003) Additional records of *Triartiger klapperichorum* from Taiwan, collected by use of flight interception traps (Coleoptera: Staphylinidae: Pselaphinae). Entomological Review of Japan 58(1): 11–12.

Yin Z-W (2018) New species and records of myrmecophilous Pselaphinae (Coleoptera: Staphylinidae) from China. Coleopterists Bulletin 72(1): 161–165. https://doi.org/10.1649/0010-065X-72.1.161

Yin Z-W (2022) The Batrisini of Tibet: unveiling an enigmatic ant-loving beetle diversity at Earth's "Third Pole" (Coleoptera, Staphylinidae, Pselaphinae). Zootaxa, 5111(1): 1–211. https://doi.org/10.11646/zootaxa.5111.1.1

Yin Z-W (2023a) Range extension and male description of a rare clavigerite beetle in China (Coleoptera: Staphylinidae: Pselaphinae). Zootaxa 5357(4): 595–600. https://doi.org/10.11646/zootaxa.5357.4.7

Yin Z-W (2023b) Occurrence of *Triartiger* Kubota (Coleoptera: Staphylinidae: Pselaphinae) on China's Mainland. Coleopterists Bulletin 77(4): 549–553. https://doi.org/10.1649/0010-065X-77.4.549

Yin Z-W, Du, J-Z (2024) The second species of *Triartiger* Kubota (Coleoptera: Staphylinidae: Pselaphinae) from China's mainland. Zootaxa 5538(5): 479–484. https://doi.org/10.11646/zootaxa.5538.5.8

Yin Z-W, He, L (2020) A new species of *Diartiger* Sharp from Sichuan, China (Coleoptera: Staphylinidae: Pselaphinae). Revue Suisse de Zoologie 127(2): 361–366. https://doi.org/10.35929/RSZ.0025

Yin Z-W, Li L-Z (2013) Notes on synonymy of *Diartiger* Sharp with *Microdiartiger* Sawada (Coleoptera: Staphylinidae: Pselaphinae), with description of two new species from East China. Zootaxa 3717(3): 369–376. https://doi.org/10.11646/zootaxa.3717.3.6

Yin Z-W, Li L-Z (2014) A new species of *Diartiger* Sharp (Staphylinidae, Pselaphinae, Clavigeritae) from the Fengyangshan-Baishanzu Nature Reserve, East China. ZooKeys 419: 129–135. https://doi.org/10.3897/zookeys.419.7867

Yin Z-W, Hlaváč P, Cuccodoro, G (2020) The first record of *Archiclaviger* in continental Asia, with description of a new species from China (Coleoptera: Staphylinidae: Pselaphinae). Acta Entomologica Musei Nationalis Pragae 60(2): 537–544. https://doi.org/10.37520/aemnp.2020.036